KENWOOD®

HI/FI STEREO COMPONENTS

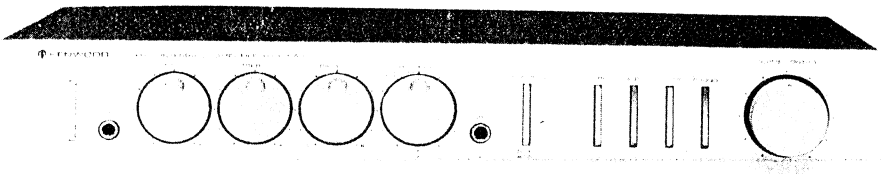
SERVICE MANUAL

KA-60

An item of adjustment is written in three languages — English, French and German.

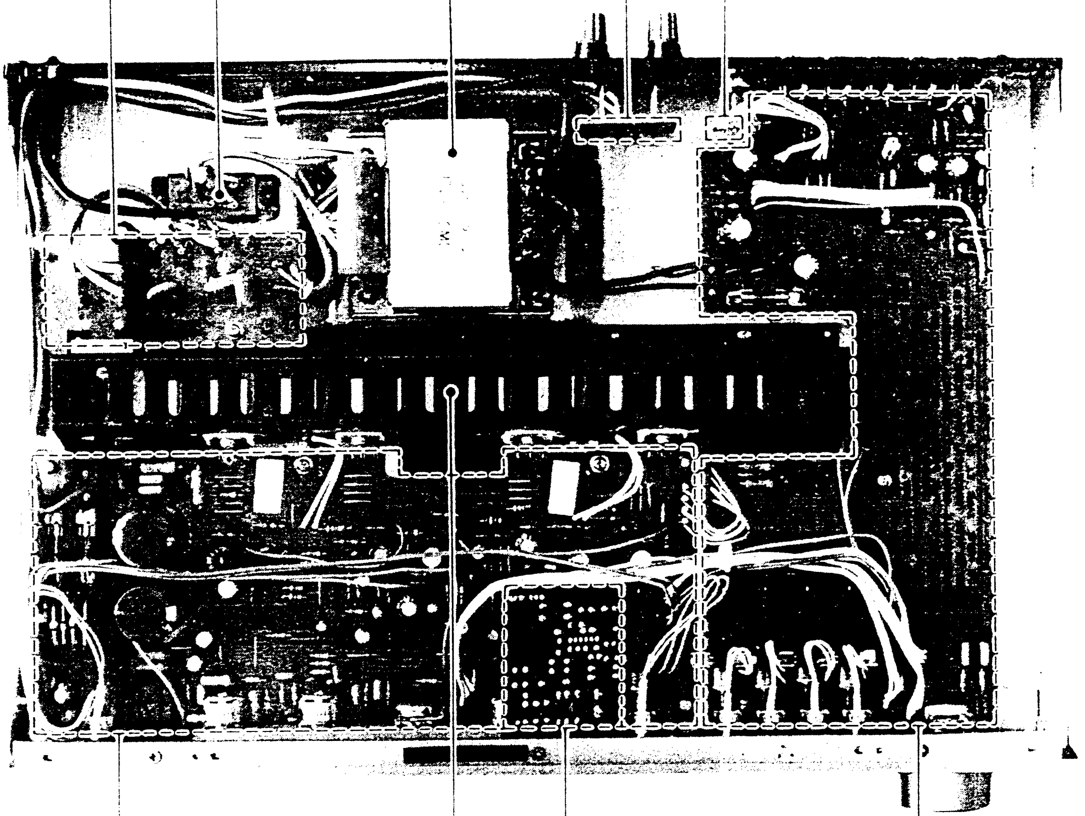
Un article sur réglages est écrit en trois langues, Anglais, Français et Allemand.

Ein Artikel der Abgleich wird auf drei Sprachen, Englische, Französisch und Deutsch geschrieben.

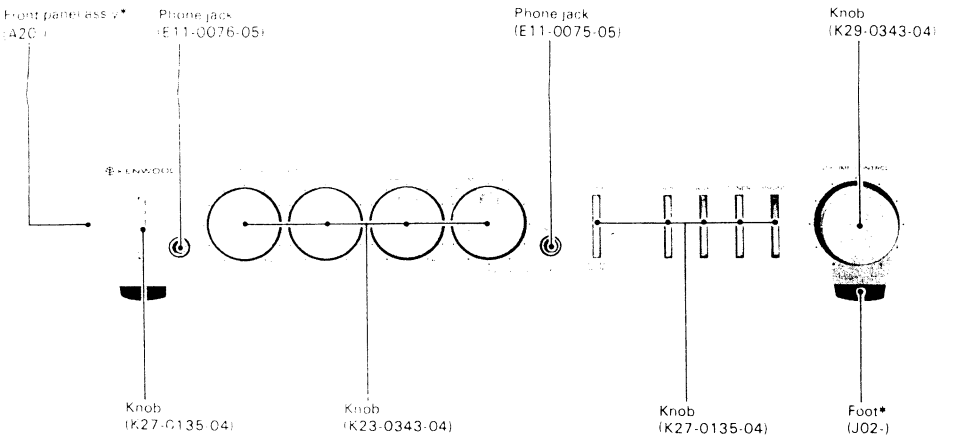


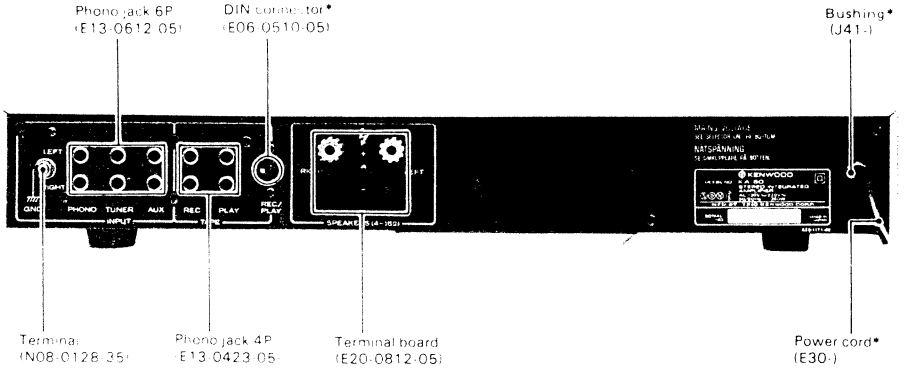
STEREO INTEGRATED AMPLIFIER

INTERNAL VIEW



This photo is E type
*Refer to Parts List (P10)

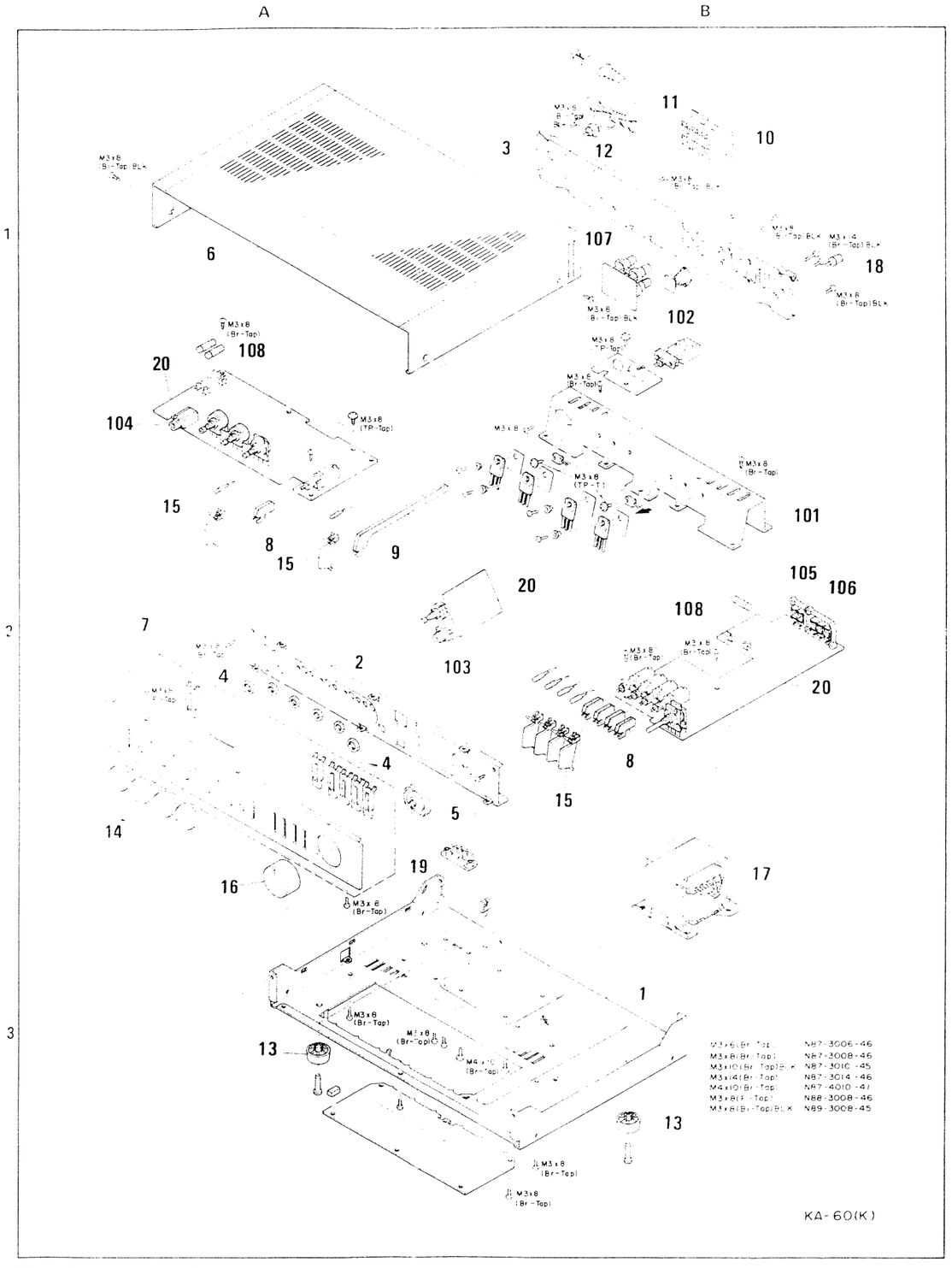




This photo is E type

* Refer to Parts List (P10)

EXPLODED VIEW



Refer to Parts List on page 10

ADJUSTMENT/REGLAGES/ABGLEICH

Idle current adjustment (bias current adjustment)

The KA-60 has no adjusting potentiometers. Fixed resistors R51 ~ R54 have been adjusted in the factory to obtain an idle current of 40 ~ 50 mA. Therefore, either of R51 or R53 (R52 or R54) may not be inserted.

After replacing the power transistor, perform as follows and, if necessary, change the values of R51 and R53 (R52 and R54).

1. Turn the volume control knob fully counter-clockwise. (Set the input level to zero.)
2. Connect a DC voltmeter across R67 (R68) of the power amplifier unit (X09-1460-108/7) as shown in the figure.
3. Make sure the DC voltmeter reading is within 20 ~ 25 mV.
4. If the reading is out of that range, change the values of R51 and R53 (R52 and R54).
   - When the reading is less than 20 mV, increase resistance.
   - When the reading is more than 25 mV, decrease resistance.

   After performing these procedures, the idle current is set to 40 ~ 50 mA.

Réglage courant dévatté (réglage courant de polarisation)

Le modèle KA-60 ne possède pas de potentiomètre de réglage. Les résistances fixes R51 ~ R54 ont été réglées en usine de façon à obtenir un courant de 40 ~ 50 mA. Par conséquent, soit R51 ou R53 (R52 ou R54) ne peuvent être insérés.

Après avoir effectué le remplacement du transistor de puissance, procéder à une vérification conformément aux instructions ci-après et modifier, s'il y a lieu, les valeurs de R51 et R53 (R52 et R54).

1. Tourner à fond le bouton de contrôle du volume dans le sens inverse des aiguilles d'une montre. (Régler le niveau de sortie sur zéro.)
2. Raccorder un voltmètre CC à R67 (R68) du bloc amplificateur (X09-1460-108/7), conformément au schéma.
3. S'assurer que la mesure indiquée par le voltmètre est comprise entre 20 et 25 mV.
4. Au cas où elle se situerait hors de ces limites, procéder à la modification des valeurs de R51 et R53 (R52 et R54).
   - Si la mesure est inférieure à 20 mV, augmenter la résistance.
   - Si la mesure est supérieure à 25 mV, diminuer la résistance.

   Après avoir terminé ces opérations, régler le courant de dévatté sur 40 à 50 mA.

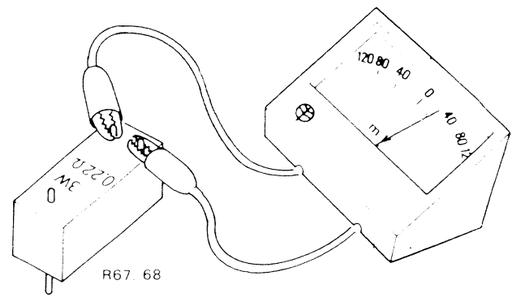
Leerlaufstromeinstellung (Vormagentisierungsstromeinstellung)

Das Modell KA-60 hat kein Einstellpotentiometer. Die Festwiderstände R51 ~ R54 sind im Werk auf eine Blindstromstärke von 40 ~ 50 mA eingestellt worden. Deshalb können entweder R51 oder R53, R52 oder R54 nicht eingesetzt werden.

Nach Auswechseln des Leistungstransistors die Prüfung wie nachstehend beschrieben vornehmen, und die Werte von R51 und R53 (R52 und R54) erforderlichenfalls ändern.

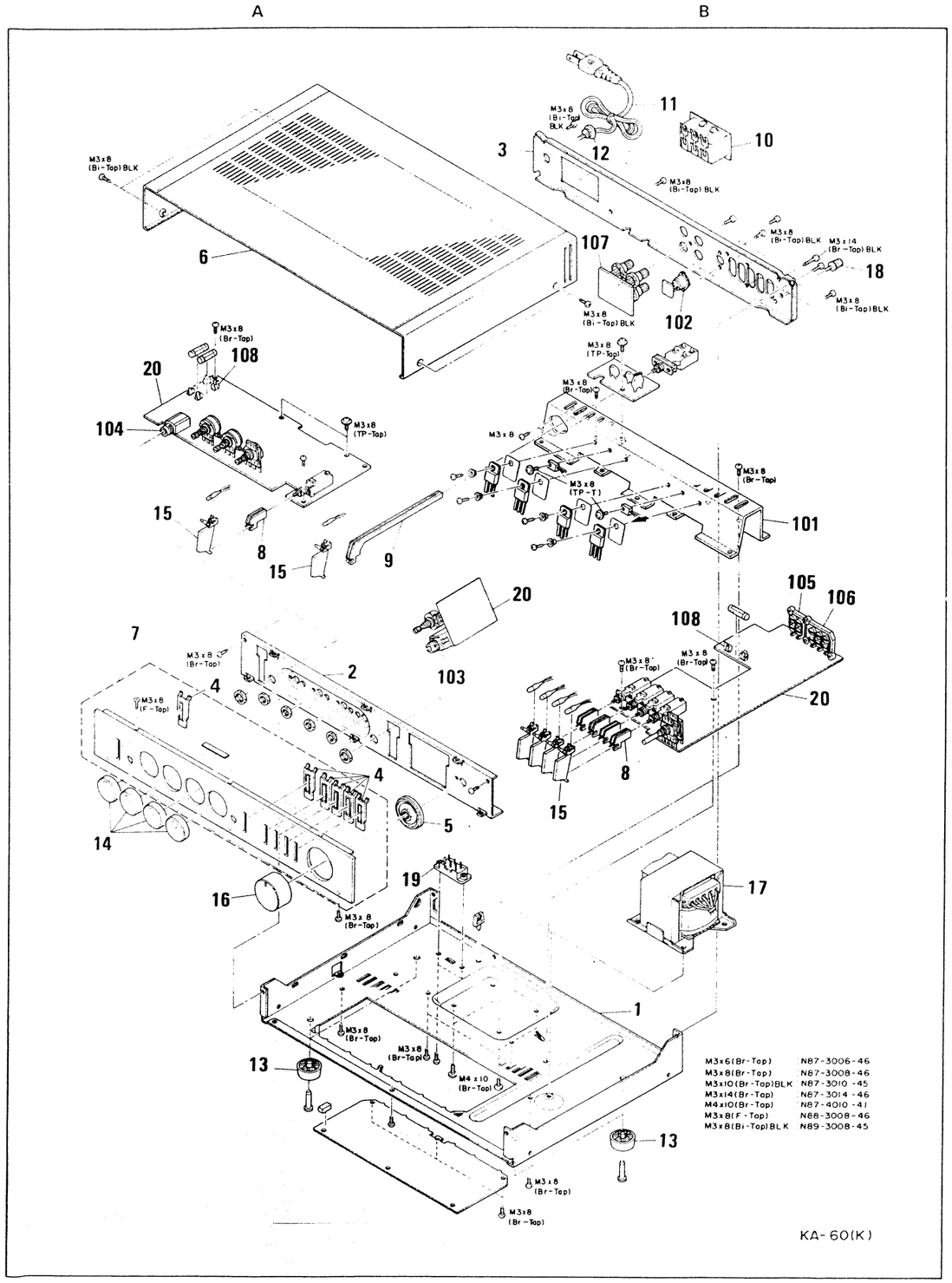
1. Den Lautstärkeregler bis zum Anschlag entgegen dem Uhrzeigersinn drehen.
   (Eingangspegel auf Null einstellen.)
2. Einen Gleichspannungsmesser über R67 (R68) der Endverstärkereinheit (X09-1460-108/7) gemäß Abbildung anschließen.
3. Sicherstellen, daß der Gleichspannungsmesser 20 ~ 25 mV anzeigt.
4. Bei einer Anzeige außerhalb dieses Bereiches die Werte von R51 und R53 (R52 und R54) ändern.
   - Bei einer Anzeige von weniger als 20 mV den Widerstand erhöhen.
   - Bei einer Anzeige von mehr als 25 mV den Widerstand verringern.

   Nach Beendung dieses Vorganges den Blindstrom auf 40 bis 50 mA einstellen.



KA-60

EXPLODED VIEW



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Après avoir effectué le remplacement du transistor d'alimentation, procéder à une vérification conformément aux instructions ci-après et modifier - s'il y a lieu - les valeurs de R51 et R53 (R52 et R54).

1. Tourner à fond le bouton de contrôle du volume dans le sens inverse des aiguilles d'une montre. (Régler le niveau de sortie sur zéro.)
2. Raccorder un voltmètre CC à R67 (R68) du bloc amplificateur (X09-1460-10B/7), conformément au schéma.
3. S'assurer que la mesure indiquée par le voltmètre est comprise entre 20 et 25 mV.
4. Au cas où elle se situerait hors de ces limites, il conviendra de modifier les valeurs de R51 et R53 (R52 et R54).
   - Si la mesure est inférieure à 20 mV, augmenter la résistance.
   - Si la mesure est supérieure à 25 mV; diminuer la résistance.

   Après avoir terminé ces opérations, régler le courant déwatté sur 40 à 50 mA.

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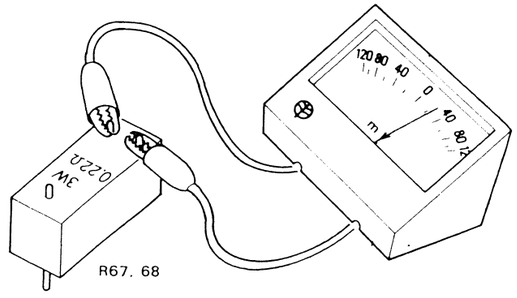
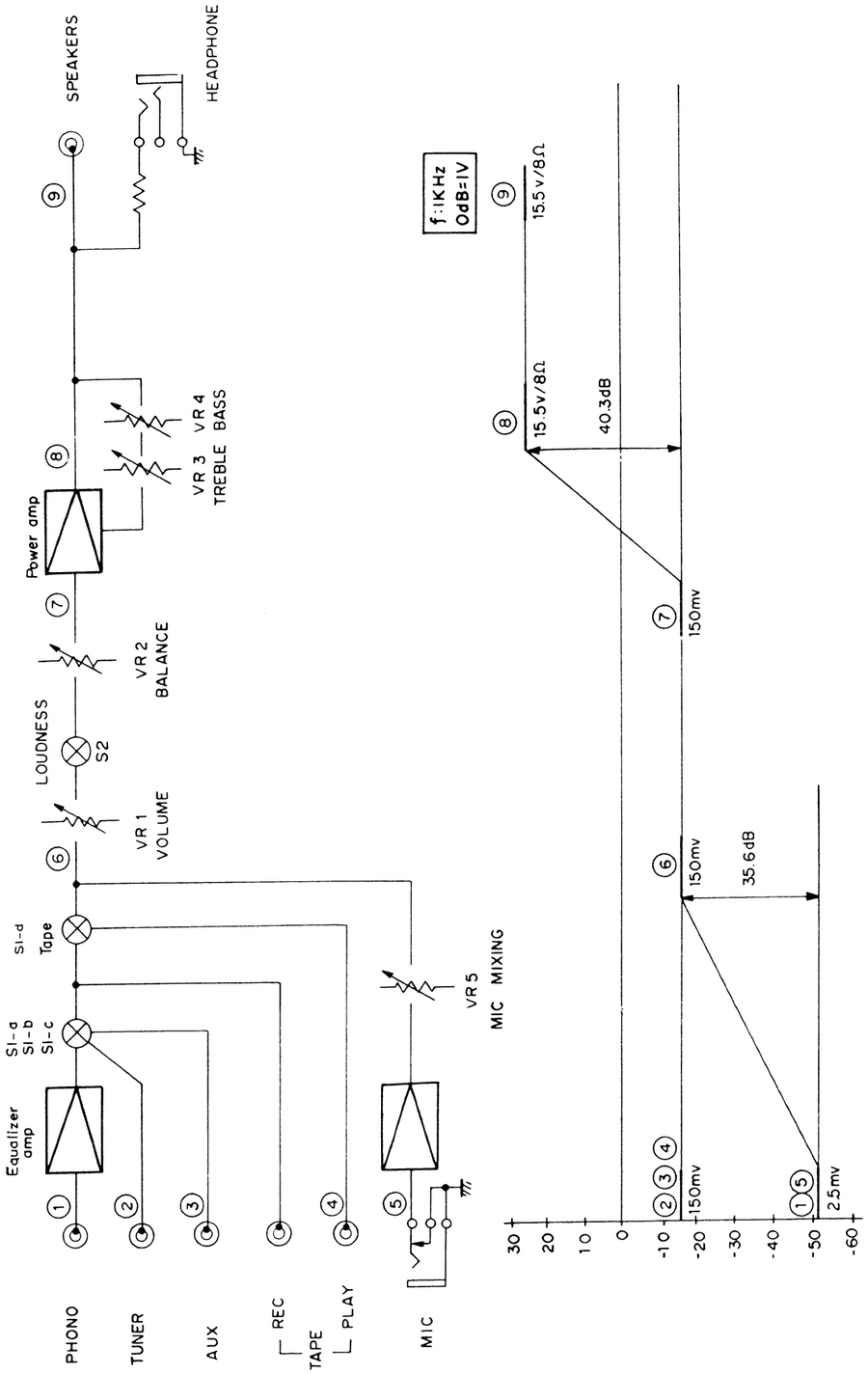
   - Bei einer Anzeige von weniger als 20 mV den Widerstand erhohen.
   - Bei einer Anzeige von mehr als 25 mV den Widerstand verringern.

Nach Beendung dieses Vorganges, den Blindstrom auf 40 bis 50 mA einstellen.



R67, 68

BLACK AND LEVEL DIAGRAM



CIRCUIT DESCRIPTION

Shock Noise Protection Circuit Q15 ~ 17

The output circuit of the KA-60 is provided with the circuit consisting of Q15 ~ 17 to prevent shock noise etc. to be emitted from the speaker, instead of a protection relay. Q15 and Q16 is active from the time the power is turned on till the power amplifier stablizes. On the other hand, Q17 is activated when the power is turned off. To simplify the explanation, the left channel will be described in the following

1. When POWER is turned ON:

If there is no protection circuit, due to the bootstrap circuit consisting of C39, R55 and R57 and for C29, Q3 is turned on for a short time. As a result, Q1 in the differential amplifier is turned off and the output tends to be negative, after this the balance of the differential amplifier tends to be restored and the potential of the output returns to 0 as shown by the chained line ① in figure 1. Such a rapid and wide variation in potential results in output of shock noise.

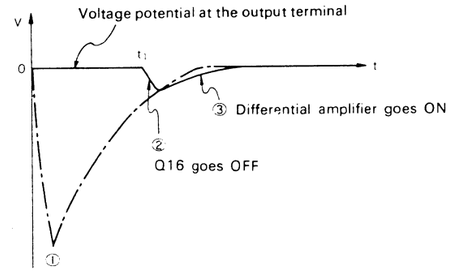


Fig. 1 Output terminal potential change

The basic operation of the shock noise protection circuit is to delay the $-V_B$ voltage in the differential amplifier of the power amplifier against the $+V_B$ voltage. Moreover, control voltage is fed through D9 during this time, to inhibit the operation of the final stage of the power amplifier. The block diagram of the power supply is shown in figure 2

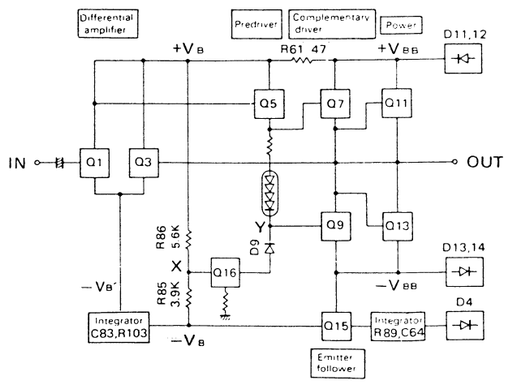


Fig. 2 Block diagram of power supply system

$+V_B$ is obtained from $+V_{BB}$ line via the resistor R61. On the other hand, $-V_B'$ is obtained by passing through two integrators after negatively rectified by D4. As integrators work as delay circuits, $-V_B'$ supply is delayed against $+V_B$ supply of the differential amplifier circuit. Until $-V_B'$ is fully supplied, full current cannot flow through the differential amplifier. In another words, differential amplifier will go on slowly. Emitter follower Q15 operates as impedance convertor so that $-V_B$ supply has low output impedance.

Considering the change in potential Vx at point X between R86 and R85, the other side of R86 is connected to $+V_B$ and the other side of R85 is connected to $-V_B$. As shown in figure 3, the drop of $-V_B$ is delayed with respect to the change in $+V_B$ resulting in the potential Vx shown by the chained line. When Vx reaches approxmately 0.7V (V_{BE}), the normal bias is applied to Q16 and becomes ON. Current flows through Q16 and D9 immediately after the power is turned on, so that the potential at point Y becomes positive. Because Q9 and D5 are reversely biased and the collector current of Q5 is insufficient, Q7, Q9, Q11 and Q13 stays OFF.

These transistors remain OFF until the potential at point X drops below approxmately 0.7V because of the delayed $-V_B$. Then Q16 will be OFF and the stages after the predriver will be ON. As Q16 is not turned off immediately, the delay indicated by ② in figure 1 occurrs. Because of the integrator, the differential amplifier is turned on slowly to suppress shock noise as shown by ③ in figure 1.

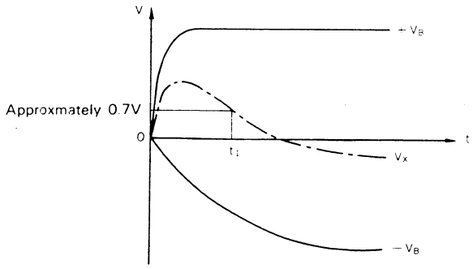


Fig. 3 Potential change of Vx at point X

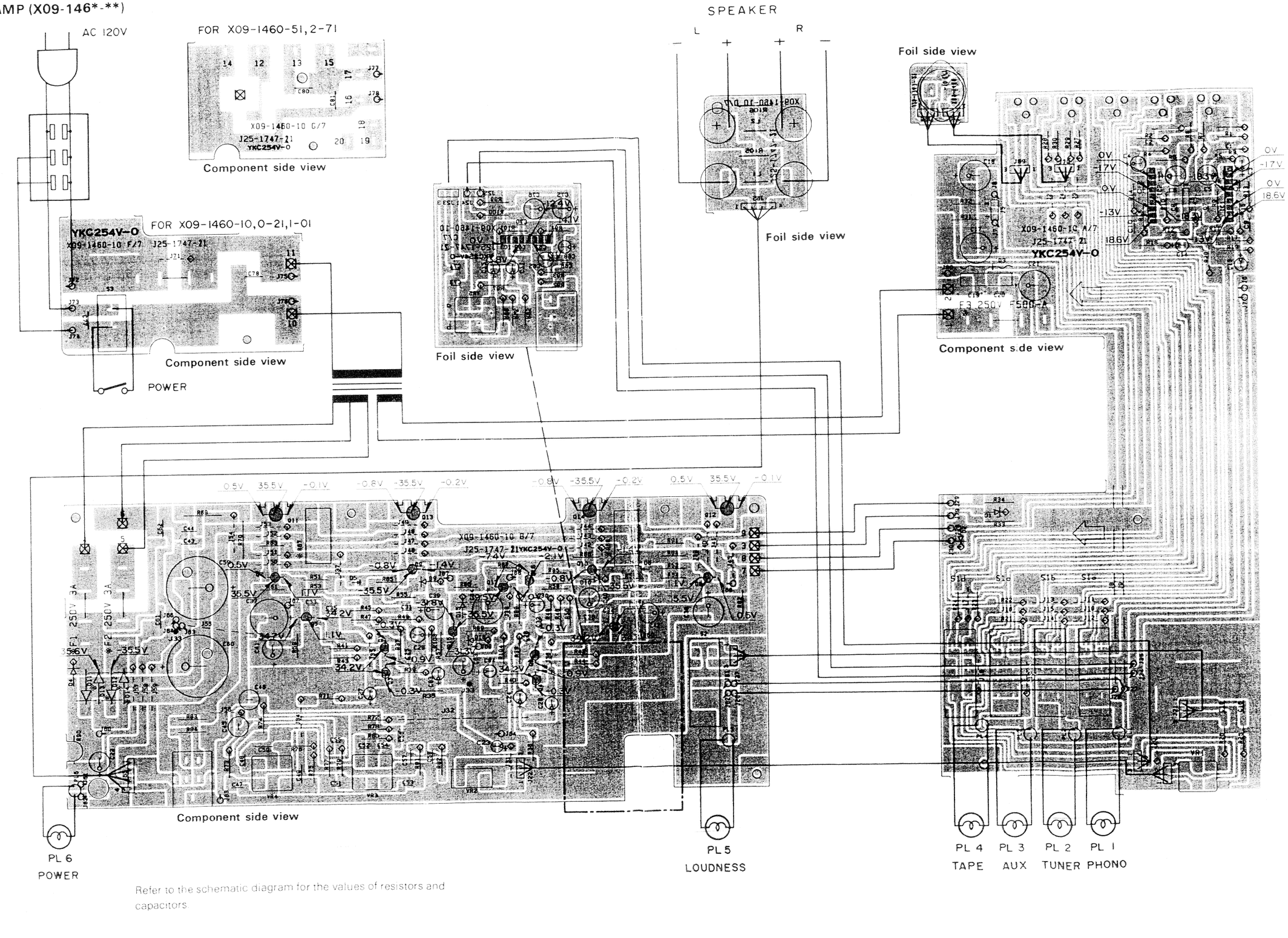
2. When POWER is turned OFF:

Q17 is provided because the power supply voltage +B to the equalizer amplifier must be dropped rapidly to suppress shock noise. When power is switched off, the charge held by C64 is discharged rapidly through D16, Q15 becomes OFF, the bias potential of Q17 become positive so it will go ON. Because of this, C17 discharges through R33 and the fall of +B will be sharp.

KA-60 KA-60

PC BOARD

AUDIO AMP (X09-146*-**)

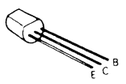


Refer to the schematic diagram for the values of resistors and capacitors.

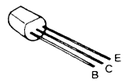
KENWOOD®

STEREO INTEGRATED AMPLIFIER

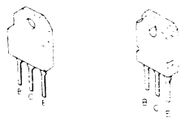
2SA (SC) (A)
2SA954
2SA992
2SC945
2SC1980



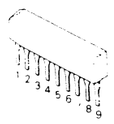
2SA850
2SC1735



2SB686
2SD716



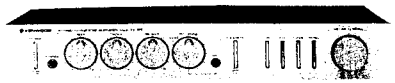
TA7322P



HA1457W-04

DC voltages are measured by ... with 20 kΩ/V input impedance

KA-60



SPECIFICATIONS

Power output

30 watts* per channel minimum RMS, both channels driven, at 8 ohms from 20 Hz to 20,000 Hz with no more than 0.08% total harmonic distortion.

Both Channels Driven	32 - 32 watts 8 ohms at 1 000 Hz 32 - 32 watts 4 ohms at 1 000 Hz
Total Harmonic Distortion (20 Hz to 20,000 Hz)	
AUX input to SPEAKER output	0.08% at rated power into 8 ohms 0.04% at 1/2 rated power into 8 ohms
PHONO input to SPEAKER output	0.08% at rated power with VOLUME - 20 dB
Intermodulation Distortion (60 Hz : 7 kHz = 4 : 1)	0.08% at rated power into 8 ohms
Damping Factor	40 (20 Hz ~ 20,000 Hz into 8 ohms
Power Bandwidth	10 Hz to 40,000 Hz at 0.08% T.H.D.
Frequency Response	10 Hz to 100 kHz : +0 dB - 3 dB
Speaker Impedance	Accept 4 ohms to 16 ohms
Input Sensitivity/Impedance	
Phono, Mic	2.5 mV, 50 kohms
Tuner, AUX, Tape	150 mV, 30 kohms
Signal to Noise Ratio (IHF, A)	
Phono	80 dB for 2.5 mV input 86 dB for 5.0 mV input 92 dB for 10 mV input
Tuner, AUX, Tape	100 dB for 150 mV input
Mic	73 dB for 2.5 mV input
Phono Maximum Input Level	180 mV (RMS), T.H.D. 0.08% at 1 000 Hz
Output Level/Impedance	
Tape REC (Pin)	150 mV, 330 ohms
(DIN)	30 mV, 75 kohms
Phono Frequency Response	RIAA standard curve, ±0.4 dB (30 Hz to 15 000 Hz)
Tone Control	
Bass	±10 dB at 100 Hz
Treble	±10 dB at 10 kHz
Loudness Control	-9 dB at 100 Hz, or -30 dB VOLUME Level

GENERAL

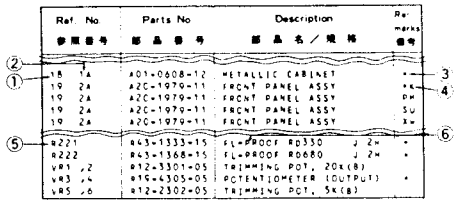
Power Requirements	60 Hz, 120 V (U.S.A. & Canada Model), or 50/60 Hz 110, 120 V, 220, 240 V, switchable
Power Consumption	2 A (UL and CSA) 90 W (IEC) 200 W (No sign)
A.C. Outlet	Switched 2, Unswitched 1
Dimensions	W 440 mm (17 10/32") H 78 mm (3 2/32") D 338 mm (13 10/32")
Weight	5.5 kg (12.1 lbs)

Kenwood follows a policy of continuous advancements in development. For this reason specifications may be changed without notice.

Kenwood strebt standige Verbesserungen in der Entwicklung an. Daher bleiben Anderungen der technischen Daten jederzeit vorbehalten.

Kenwood poursuit une politique de progrès constants en ce qui concerne le developpement. Pour cette raison les specifications sont sujettes à modifications sans preavis.

INSTRUCTION FOR PARTS LIST



1 Exploded view drawing No.
2 Position in exploded view
3 Symbol of new parts
4 Area to which parts are shipped. Example: A20-1390-13 is the part No. of FRONT PANEL ASS'Y for the "K" type products (for U.S.A.). When this column is blank, it means that the same type of parts (same parts No.) are used for the products shipped to all areas.
5 Reference No. in schematic diagram
6 Abbreviation of "Ceramic capacitor"

All capacitors and resistors are listed using abbreviations.

Abbreviations

* Abbreviations of capacitors (Parts No. with initial letter "C")

ELECTRO	Electrolytic capacitor
LL-ELEC	Low leak electrolytic capacitor
NP-ELEC	Non pole electrolytic capacitor
MICA	Mica capacitor
POLYSTY	Polystyrene capacitor
MYLAR	Mylar capacitor
CERAMIC	Ceramic capacitor
TANTAL	Tantalum capacitor
MF	Metallized film capacitor
MP	Metallized paper capacitor
OIL	Oil capacitor

The unit of capacitors is μF.

* Abbreviations of resistors (Parts No. "R" with initial letter "R")

RC	Carbon composition resistor
RD	Carbon film resistor
FL-PROOF RD	Flame proof carbon film resistor
RW	Wire wound power resistor
FL-PROOF RS	Flame proof metal oxide film resistor
RN	Metal film resistor
FUSE-RESIST	Resistor with fuse function
2B	Rated wattage 1/8W
2E	Rated wattage 1/4W
2H	Rated wattage 1/2W
3A	Rated wattage 1W
3D	Rated wattage 2W
3F	Rated wattage 3W
3G	Rated wattage 4W
3H	Rated wattage 5W

All resistor values are indicated with the unit (Ω) omitted.

* Abbreviations common to capacitors and resistors

C	±0.25pF (Used for capacitors only)
D	±0.5pF (Used for capacitors only)
F	±1%
G	±2%
J	±5%
K	±10%
M	±20%
Z	+80% -20% (Used for capacitors only)
P	+100% -0% (Used for capacitors only)

Resistors RD (carbon composition resistors) are not listed in the parts list. For values, refer to the schematic diagram.

CODE's in X09-146*-**

K : X09-1460-10
P : X09-1461-01
M : X09-1460-21
T : X09-1460-51
E : X09-1462-71

PARTS LIST

Ref. No. 参照番号	Parts No. 部品番号	Description 部品名／規格	Re-marks 備考
KA-60 (UNIT)			
1 3B	-	MAIN CHASSIS	
2 2A	-	SUB PANEL	
3 1B	-	REAR PANEL	
4 2A	-	ESCUTCHEON (POWER SEL.)	
5 2A	-	ESCUTCHEON (VOLUME)	
6 1A	A01-0376-03	METALLIC CABINET	*
7 2A	A20-1620-02	FRONT PANEL ASS'Y	*
7 2A	A20-1621-02	FRONT PANEL ASS'Y	*
-	B46-0055-20	WARRANTY CARD	P
-	B46-0060-00	WARRANTY CARD	T
-	B46-0061-20	WARRANTY CARD	K
-	B46-0062-20	WARRANTY CARD	UH
-	B46-0062-20	WARRANTY CARD	UE
-	B46-0063-13	WARRANTY CARD	UH
-	B46-0063-13	WARRANTY CARD	UE
-	B46-0064-10	WARRANTY CARD	X
-	B50-3129-00	INSTRUCTION MANUAL	*U
-	B50-3129-00	INSTRUCTION MANUAL	UE
-	B50-3129-00	INSTRUCTION MANUAL	H
-	B50-3130-00	INSTRUCTION MANUAL	*P
-	B50-3130-00	INSTRUCTION MANUAL	MX
-	B50-3131-00	INSTRUCTION MANUAL	*T
-	B50-3132-00	INSTRUCTION MANUAL	*E
-	B50-3222-00	INSTRUCTION MANUAL	*K
-	B59-0018-00	SERVICE STATIONS' LIST	UH
-	B59-0018-00	SERVICE STATIONS' LIST	UE
8 2A,2B	D21-0460-04	EXTENSION SHAFT(A) x5	*
9 2A	D21-0461-04	EXTENSION SHAFT(B)	*
10 1B	E03-0007-05	AC OUTLET	*U
10 1B	E03-0007-05	AC OUTLET	MH
10 1B	E03-0007-05	AC OUTLET	J
10 1B	E03-0007-05	AC OUTLET	UE
10 1B	E03-0009-05	AC OUTLET	P
11 1B	E30-0181-05	POWER CORD	*P
11 1B	E30-0185-05	POWER CORD	J
11 1B	E30-0459-05	POWER CORD	E
11 1B	E30-0515-05	POWER CORD	UH
11 1B	E30-0515-05	POWER CORD	H
11 1B	E30-0515-05	POWER CORD	UE
11 1B	E30-0587-05	POWER CORD	T
-	H01-3139-04	CARTON BOX	*K
-	H01-3139-04	CARTON BOX	UM
-	H01-3139-04	CARTON BOX	HA
-	H01-3139-04	CARTON BOX	UE
-	H01-3142-04	CARTON BOX	*E
-	H10-1536-03	POLYSTYRENE FIXTURE	
-	H25-007E-04	BAG (530x450)	
-	H25-0179-04	BAG	
-	J19-0515-05	PC BOARD SUPPORT	TE
12 1B	J41-0024-15	BUSHING (POWER CORD)	K
12 1B	J41-0033-05	BUSHING (POWER CORD)	UK
12 1B	J41-0033-05	BUSHING (POWER CORD)	HT
12 1B	J41-0033-05	BUSHING (POWER CORD)	E
12 1B	J41-0033-05	BUSHING (POWER CORD)	UE
12 1B	J41-0034-05	BUSHING (POWER CORD)	KP
13 3A,3B	J02-0088-05	FOOT x4	K
13 3A,3B	J02-0089-05	FOOT x4	PU
13 3A,3B	J02-0089-05	FOOT x4	HA

Ref. No. 参照番号	Parts No. 部品番号	Description 部品名／規格	Re-marks 備考
13 3A,3B	J02-0089-05	FOOT x4	XT
13 3A,3B	J02-0089-05	FOOT x4	E
13 3A,3B	J02-0089-05	FOOT x4	UE
14 2A	K23-0343-04	KNOB (BASS,TREBLE)	*
14 2A	K23-0343-04	KNOB (BALANCE,MIC)	*
15 2A,2B	K27-0135-04	KNOB (SELECTOR,POWER)	*
16 3A	K29-0343-04	KNOB (VOLUME)	*
17 3B	L01-2031-05	POWER TRANSFORMER	*K
17 3B	L01-2035-05	POWER TRANSFORMER	*U
17 3B	L01-2035-05	POWER TRANSFORMER	MH
17 3B	L01-2035-05	POWER TRANSFORMER	X
17 3B	L01-2035-05	POWER TRANSFORMER	UE
17 3B	L01-2036-05	POWER TRANSFORMER	*T
17 3B	L01-2036-05	POWER TRANSFORMER	E
17 3B	L01-2037-05	POWER TRANSFORMER	*P
-	N09-0303-05	SCREW (DIN CONNECTOR)	
18 1B	N08-0128-35	TERMINAL (GND)	
19 3A	S31-2053-05	SLIDE SWITCH (VOLTAGE)	UK
19 3A	S31-2053-05	SLIDE SWITCH (VOLTAGE)	HA
19 3A	S31-2053-05	SLIDE SWITCH (VOLTAGE)	E
19 3A	S31-2053-05	SLIDE SWITCH (VOLTAGE)	UE
20 1A,2B	X09-1460-10	AUDIO AMP PCB ASS'Y	*K
20 1A,2B	X09-1460-21	AUDIO AMP PCB ASS'Y	*U
20 1A,2B	X09-1460-21	AUDIO AMP PCB ASS'Y	MH
20 1A,2B	X09-1460-21	AUDIO AMP PCB ASS'Y	UE
20 1A,2B	X09-1460-21	AUDIO AMP PCB ASS'Y	X
20 1A,2B	X09-1460-51	AUDIO AMP PCB ASS'Y	*T
20 1A,2B	X09-1461-01	AUDIO AMP PCB ASS'Y	*P
20 1A,2B	X09-1462-71	AUDIO AMP PCB ASS'Y	*E
AUDIO AMP (X09-146*-)**			
101 1B,2B	-	HEAT SINK	
PL1 -4	B30-0226-05	LAMP	*
PL5 ,6	B30-0227-05	LAMP	*
C1 ,2	C71-1710-15	CERAMIC 100PF J	
C3 ,4	C25-1210-67	LL-ELEC 10UF 16WV	
C5 ,6	C24-0822-71	ELECTRO 220UF 6.3WV	
C7 ,8	C52-1733-16	CERAMIC 330PF K	
C9 ,10	C46-1736-35	MYLAR 0.036UF J	
C11 ,12	C46-1710-35	MYLAR 0.01UF J	
C13 ,14	C24-1733-51	ELECTRO 3.3UF 50WV	
C15 ,16	C46-1727-35	MYLAR 0.027UF J	
C17 ,18	C24-1433-71	ELECTRO 330UF 25WV	
C19 ,20	C53-1710-37	CERAMIC 0.01UF M	
C21	C24-1247-71	ELECTRO 470UF 16WV	
C22	C24-1747-61	ELECTRO 47UF 50WV	
C23 ,24	C25-1747-47	LL-ELEC 0.47UF 50WV	
C25 ,26	C71-1718-16	CERAMIC 180PF K	
C27 ,28	C24-1210-61	ELECTRO 10UF 16WV	
C29 ,30	C24-1010-71	ELECTRO 100UF 10WV	
C31 ,32	C71-1703-01	CERAMIC 3PF C	
C33 ,34	C71-1702-01	CERAMIC 2PF C	
C35 ,36	C71-1703-01	CERAMIC 3PF C	
C37 ,38	C24-1710-71	ELECTRO 100UF 50WV	
C39 ,40	C24-1747-61	ELECTRO 47UF 50WV	
C41 ,42	C24-0822-71	ELECTRO 220UF 6.3WV	
C43 ,44	C46-1747-35	MYLAR 0.047UF J	
C45 ,46	C26-1747-57	NP-ELEC 4.7UF 50WV	
C47 ,48	C46-1718-35	MYLAR 0.018UF J	
C49 ,50	C46-1782-35	MYLAR 0.082UF J	

PARTS LIST

Ref. No. 参照番号	Parts No. 部品番号	Description 部品名／規格	Remarks 備考
C51 ,52	C71-1710-15	CERAMIC 100PF J	
C53 ,54	C52-1747-16	CERAMIC 470PF K	
C55 ,56	C46-1747-25	MYLAR 0.0047UF J	
C57 ,58	C46-1722-35	MYLAR 0.022UF J	
C59 ,60	C90-0468-05	ELECTRO 6800UF 42WV	*
C61 ,62	C54-2710-39	CERAMIC 0.01UF P	
C63	C24-1747-61	ELECTRO 47UF 50WV	
C64	C24-1710-71	ELECTRO 100UF 50WV	
C65	C25-1747-47	LL-ELEC 0.47UF 50WV	
C66 ,67	C71-1710-15	CERAMIC 100PF J	
C68	C24-1447-51	ELECTRO 4.7UF 25WV	
C69	C71-1733-06	CERAMIC 33PF K	
C70	C52-1747-16	CERAMIC 470PF K	
C71 ,72	C24-1210-61	ELECTRO 10UF 16WV	
C73 ,74	C71-1733-06	CERAMIC 33PF K	
C75 ,76	C24-1447-61	ELECTRO 47UF 25WV	
C77 ,78	C91-0023-05	CERAMIC 0.01UF AC250V	M
C77 ,78	C91-0079-05	CERAMIC 0.01UF AC125V	KP
C80 ,81	C91-0079-05	CERAMIC 0.01UF AC125V	TE
C82	C53-1710-37	CERAMIC 0.01UF M	
C83 ,84	C24-1410-61	ELECTRO 10UF 25WV	
C85 ,86	C55-1722-38	CERAMIC 0.022UF Z	
J02 1B	E06-0510-05	DIN CONNECTOR	
J03 2A	E11-0075-05	PHONE JACK (MICROPHONE)	*
J04 1A	E11-0076-05	PHONE JACK (HEADPHONE)	*
J05 2B	E13-0423-05	PHONO JACK 4P	
J06 2B	E13-0612-05	PHONO JACK 6P	
J07 1B	E20-0812-05	SPEAKER TERMINAL BOARD	
F1 ,2	F05-4022-05	FUSE 4A	M
F1 ,2	F05-4024-05	FUSE 4A	TE
F1 ,2	F05-5021-05	FUSE 5A	KP
F3	F05-5015-05	FUSE 0.5A	E
J08 1A,2B	J13-0055-05	FUSE HOLDER X4	KM
J08 1A,2B	J13-0055-05	FUSE HOLDER X4	TE
J08 1A,2B	J13-0055-05	FUSE HOLDER X6	E
-	N09-0314-05	SCREW	
R31 ,32	R43-1210-15	FL-PROOF RD100 J 2E	
R33	R47-5482-15	FL-PROOF RS820 J 3A	
R34	R47-5456-15	FL-PROOF RS560 J 3A	
R51 ,52	R43-1256-05	FL-PROOF RD56 J 2E	M
R51 ,52	R43-1262-05	FL-PROOF RD62 J 2E	KP
R51 ,52	R43-1262-05	FL-PROOF RD62 J 2E	TE
R53 ,54	R43-1282-05	FL-PROOF RD82 J 2E	
R55 -58	R43-1227-25	FL-PROOF RD2,7K J 2E	
R59 -62	R43-1247-05	FL-PROOF RD47 J 2E	
R63 -66	R43-1233-15	FL-PROOF RD330 J 2E	
R67 ,68	R90-0128-05	MULTIPLE COMPONENTS	M
R67 ,68	R90-0138-05	MULTIPLE COMPONENTS	KT
R67 ,68	R90-0138-05	MULTIPLE COMPONENTS	EP
R69 ,70	R47-5547-95	FL-PROOF RS4,7 J 3D	
R83 ,84	R47-5456-15	FL-PROOF RS560 J 3A	
R85	R40-8339-26	RC 3,9K K 2H	
R86	R40-8356-26	RC 5,6K K 2H	
R90	R47-5439-25	FL-PROOF RS3,9K J 3A	
R91	R47-5456-15	FL-PROOF RS560 J 3A	
VR1	R06-5053-05	POTENTIOMETER	*
VR2	R01-5029-05	POTENTIOMETER	*
VR3 ,4	R06-5052-05	POTENTIOMETER	*
VR5	R06-5051-05	POTENTIOMETER	*

Ref. No. 参照番号	Parts No. 部品番号	Description 部品名／規格	Remarks 備考
S1	S42-4013-05	PUSH SWITCH (SELECTOR)	*
S2	S40-4031-05	PUSH SWITCH (LOUDNESS)	*
S3	S40-1020-05	PUSH SWITCH (POWER)	*M
S3	S40-1021-05	PUSH SWITCH (POWER)	*K
S3	S40-1030-05	PUSH SWITCH (POWER)	F
S3	S40-2099-05	PUSH SWITCH (POWER)	TE
D1 ,2	V11-4107-30	CZ-185	
D3	V11-5100-60	RB-151	
D4	V11-0295-05	W06B	*
D5 ,6	V11-5100-50	STV-4H	
D9 ,10	V11-0273-05	1S2076A	
D11 -14	V11-2100-10	U05C(S)	
D15 ,16	V11-0271-05	1S2076	
IC1 ,2	V30-0453-10	TA7322P	*
IC3	V30-0264-30	HA1457W-04	
Q1 -4	V03-1980-30	2SC1980(S,T,U)	
Q5 ,6	V01-0992-00	2SA992	
Q7 ,8	V03-0452-05	2SC1735	
Q9 ,10	V01-0173-05	2SA850	
Q11 ,12	V04-0716-00	2SD716	*
Q13 ,14	V02-0686-00	2SB686	*
Q15	V01-0954-00	2SA954	
Q16	V01-0733-90	2SA733(A)	
Q17	V03-0297-05	2SC945	